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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,531	10/06/2003	Hiroto Sugahara	501558.20003	3968

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EXAMINER	
MRUK, GEOFFREY S	

ART UNIT	PAPER NUMBER
2853	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

## *Office Action Summary*	**Application No.**	**Applicant(s)**	
	10/679,531	SUGAHARA, HIROTO	
	Examiner	**Art Unit**	
	Geoffrey Mruk	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) *7,11-19 and 23* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-10,20-22 and 24-30* is/are rejected.

7)☒ Claim(s) *31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6, 8-10, 20-22, 24, 25, and 27-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi (US 2002/0140787 A1).

With respect to claim 1, Takahashi discloses a pressure producing apparatus, comprising:

- a sheet member (Fig. 25, element 411) which is formed of a piezoelectric material (paragraph 0129);
- a plurality of first electrodes (Fig. 25, elements 413a-413f) which are embedded (paragraph 0154) in a first area of one of a first portion and a second portion of the sheet member, such that the first electrodes are separate from each other in the first area, the first portion and the second portion being opposite to each other in a direction of thickness of the sheet member; and
- a plurality of second electrodes (Fig. 25, elements 412a-412f) which are embedded (paragraph 0154) in a second area of said one of the first and second portions of the sheet member, such that the second electrodes are separate from each other in the second area, the second area being adjacent to the first area in a surface direction parallel to one of a first surface of the first portion and a

second surface of the second portion, the first surface and the second surface being opposite to each other in the direction of thickness of the sheet member (paragraphs 0137-0138).

With respect to claim 2, Takahashi discloses the first electrodes (Fig. 25, elements 413a-413f) and the second electrodes (Fig. 25, elements 412a-412f) are embedded (paragraph 0154) in said one of the first and second portions of the sheet member, such that the first electrodes and the second electrodes extend from said one of the first and second surfaces of the first (Fig. 25, element 411e) and second portions (Fig. 25, element 411f) of the sheet member (Fig. 25, element 411) in the direction of thickness thereof.

With respect to claim 3, Takahashi discloses a plurality of portions of said one of the first (Fig. 25, element 411e) and second portions (Fig. 25, element 411f) of the sheet member (Fig. 25, element 411) that are located between the plurality of first electrodes (Fig. 25, elements 413a-413f) and said the plurality of second electrodes (Fig. 25, elements 412a-412f) is are polarized in the surface direction, so as to provide a plurality of active portions, and wherein when an electric field (paragraph 0149) is applied to each of the active portions of the sheet member in a same direction as the direction of polarization (paragraphs 0142-0143) of the said each active portion, the sheet member is curved in the direction of thickness thereof because of a difference between an amount of elongation in the surface direction of said one of the first and second portions of the sheet member are provided and an amount of elongation in the surface direction of the other of the first and second portions (paragraphs 0149-0150).

With respect to claim 4, Takahashi discloses wherein the first (Fig. 25, elements 413a-413f) and second electrodes (Fig. 25, elements 412a-412f) are embedded (paragraph 0154) in a limited portion of said one of the first and second portions of the sheet member that is limited in the surface direction.

With respect to claim 6, Takahashi discloses the first electrodes (Fig. 25, elements 413a-413f) comprise a plurality of groups of said first electrodes and the second electrodes (Fig. 25, elements 412a-412f) comprise a plurality of groups of said second electrodes, wherein the plurality of groups of first electrodes are arranged along a plurality of first straight lines as a plurality of said first lines, respectively, and the plurality of groups of second electrodes are arranged along a plurality of second straight lines as a plurality of said second lines, respectively, and wherein the groups of first electrodes and the groups of second electrodes are alternate with each other in a direction intersecting the first and second straight lines (Fig. 25, paragraph 0130).

With respect to claim 8, Takahashi discloses a liquid-chamber (Fig. 25, element 20) defining member which cooperates with the other of the first and second surfaces of the sheet member that does not correspond to said one of the first and second portions to define a liquid chamber (Fig. 25, element 24) in which a liquid is accommodated, and wherein the apparatus changes a pressure of the liquid accommodated in the liquid chamber (paragraph 0150).

With respect to claim 9, Takahashi discloses the first electrodes (Fig. 25, elements 413a-413f) comprise a plurality of groups of first electrodes and the second electrodes (Fig. 25, elements 412a-412f) comprise a plurality of groups of said second electrodes, wherein the liquid-chamber (Fig. 25, element 20) defining member includes at least one partition wall (Fig. 25, element 21A) which cooperates with said other of the first and second surfaces of the sheet member to define a plurality of liquid chambers (Fig. 25, element 24) in each of which the liquid is accommodated, and wherein the plurality of groups of first electrodes and the plurality of groups of second electrodes are provided in a plurality of limited portions of said one of the first and second portions of the sheet member, respectively, that are aligned with the plurality of liquid chambers, respectively (Fig. 25, element M).

With respect to claim 10, Takahashi discloses the first portion of the sheet member (Fig. 25, element 411) comprises a first sheet member (Fig. 25, element 411) and the first electrodes (Fig. 25, elements 413a-413f) are embedded in the first sheet member, wherein the second electrodes (Fig. 25, elements 412a-412f) are embedded in the first sheet member (Fig. 25, element 411) and wherein the second portion (Fig. 25, element 411f) of the sheet member comprises a second sheet member (Fig. 25, element 411e) which is stacked on the first sheet member and resists elongation of the first sheet member in the surface direction that occurs when an electric field is applied, in the surface direction, to a plurality of portions of the first sheet member that are located between said at least one first electrodes least one the second electrodes (paragraphs 0150-0151).

With respect to claim 20, Takahashi discloses a pressure producing apparatus, comprising:

- a sheet member (Fig. 25, element 411) which is formed of a piezoelectric material (paragraph 0129);
- a plurality of first electrodes (Fig. 25, elements 413a-413f) of a plurality of first electrodes which is are embedded (paragraph 0154) in a first area at least one of a first portion and a second portion of the sheet member, such that the first electrodes are separate from each other in the first area the first portion and the second portion being opposite to each other in a direction of thickness of the sheet member;
- a plurality of second electrodes (Fig. 25, elements 412a-412f) which is are embedded (paragraph 0154) in a second area of said at least one of the first and second portions of the sheet member, such that the second electrodes are separate from each other in the second area, the second area being adjacent to the first area in a surface direction parallel to a first surface of the first portion and a second surface of the second portion that are opposite to each other in the direction of thickness of the sheet member (paragraphs 0137-0138); and
- a liquid-chamber (Fig. 25, element 20) defining member which cooperates with one of the first and second surfaces of the sheet member to define a liquid chamber in which a liquid is accommodated (paragraph 0151),
- wherein an electric field (paragraph 0149) is applied between the first electrodes and the second electrodes, so as to produce a difference between an amount of elongation in the surface direction of the first portion of the sheet member and an amount of elongation in the surface direction of the second portion of the sheet

member and thereby curve the sheet member in the direction of thickness thereof and change a pressure of the liquid accommodated in the liquid chamber (paragraphs 0148-0150).

With respect to claim 21, Takahashi discloses the liquid chamber (Fig. 25, element 24) of the liquid-chamber (Fig. 25, element 20) defining member accommodates an ink as the liquid, and wherein the apparatus further comprises a nozzle-defining member (Fig. 25, element 25) which defines a nozzle which communicates with the liquid chamber and ejects a droplet of the ink when the sheet member is curved (Fig. 29, element 411) in the direction of thickness thereof to change the pressure of the ink accommodated in the liquid chamber (paragraphs 0148-0150).

With respect to claim 22, Takahashi discloses the first portion and the second portion of the sheet member (Fig. 25, element 411) comprises a first sheet member and a second sheet member, respectively, which are stacked on each other and wherein the first electrodes (Fig. 25, elements 413a-413f) are embedded in said at least one of the first sheet member and the second sheet member, wherein the liquid-chamber defining member (Fig. 25, element 20) cooperates with one of the first and second surfaces of the first and second sheet members to define a the liquid chamber in which a the liquid is accommodated, and wherein a the electric field is applied between the one first electrodes and the second electrodes, so as to produce a difference between an amount of elongation in the surface direction of the first sheet member and an amount of elongation in the surface direction of the second sheet member and thereby curve the first and second sheet members in the respective directions of thickness thereof and change the pressure of the liquid accommodated in the liquid chamber (paragraphs 0145-0151).

With respect to claim 24, Takahashi discloses the plurality of first electrodes (Fig. 25, elements 413a-4123) comprise a plurality of groups of first electrodes each group of which include at least two first electrodes and are embedded (paragraph 0154) in a corresponding one of a plurality of said first areas of said one of the first portion and the second portion of the sheet member (Fig. 25, element 411), such that said at least two first electrodes are separate from each other in said corresponding first area, and the plurality of second electrodes(Fig. 25, elements 412a-412f) comprise a plurality of groups of second electrodes each group of which includes at least two second electrodes and are embedded (paragraph 0154) in a corresponding one of a plurality of said second areas of said one of the first and second portions of the sheet member, such that said at least two second electrodes are separate from each other in said corresponding second area, and wherein the plurality of first areas and the plurality of second areas are arranged alternately with each other in the surface direction (paragraph 0130).

With respect to claim 25, Takahashi discloses each of the plurality of first areas and the plurality of second areas has an elongate shape (Fig. 26, elements 412, 413).

With respect to claim 27, Takahashi discloses the plurality of first electrodes (Fig. 25, elements 413a-413f) comprise a plurality of groups of first electrodes each group of which include at least two first electrodes and are embedded (paragraph 0154) in a corresponding one of a plurality of said first areas of said at least one of the first portion and the second portion of the sheet member (Fig. 25, element 411), such that said at least two first electrodes are separate from each other in said corresponding first area, and the plurality of second electrodes comprise a plurality of groups of second electrodes (Fig. 25, elements 412a-412f) each group of which includes at least two second electrodes and are embedded in a corresponding one of a plurality of said second areas of said at least one of the first and second portions of the sheet member, such that said at least two second electrodes are separate from each other in said corresponding second area, and wherein the plurality of first areas and the plurality of second areas are arranged alternately with each other in the surface direction (paragraph 0130).

With respect to claim 28, Takahashi discloses the first electrodes (Fig. 26, elements 413a-413f) are arranged along a first line in the first area and the second electrodes (Fig. 26, elements 412a-412f) are arranged, in the second area, along a second line which is separate from, and opposed to, the first line in the surface direction.

With respect to claim 29, Takahashi discloses the first electrodes (Fig. 25, elements 413a-413f) are arranged along a first line in the first area and the second electrodes (Fig. 25, elements 412a-412f) are arranged, in the second area, along a second line which is separate from, and opposed to, the first line in the surface direction.

With respect to claim 30, Takahashi discloses each of the first (Fig. 25, elements 413a-413f) and second electrodes (Fig. 25, elements 412a-412f) has a columnar shape (paragraph 0074, i.e. electrode thickness) having a substantially constant cross-section area in a direction parallel to an axis line thereof, and is embedded in said one of the first and second portions of the sheet member (Fig. 25, element 411) such that the axis line of said each electrode extends substantially parallel to the direction of thickness of the sheet member.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5 and 26 rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi (US 2002/0140787 A1) in view of Takuchi (US 5,592,042).

With respect to claims 5 and 26, Takahashi discloses:

- the first electrodes (Fig. 25, elements 413a-413f) comprise a plurality of groups of said first electrodes and the second electrodes (Fig. 25, elements 412a-412f) comprise a plurality of groups of said second electrodes, and
- the plurality of first areas and the plurality of second areas (Fig. 25, element 411).

However, Takahashi fails to disclose:

- wherein the plurality of groups of first electrodes are arranged along a plurality of concentric first circles as a plurality of said first lines, respectively, and the plurality of groups of second electrodes are arranged along a plurality of concentric second circles as a plurality of said second lines, respectively, and wherein the first and second circles are concentric with each other and the groups of first electrodes and the groups of second electrodes are alternate with each other in a radial direction of the concentric first and second circles, and

- each of the plurality of first areas and the plurality of second areas has an annular shape.

Takuchi discloses a piezoelectric/electrostrictive actuator where "In the piezoelectric/electrostrictive actuators shown in FIGS. 2 and 11, the substrates 2 have a square and a circular shape, respectively. On one of the opposite major surfaces of the square substrate 2 of FIG. 2, the electrodes 4 are formed as concentric circular strips 4, while the piezoelectric/electrostrictive elements 6 are formed so as to fill annular spaces defined between the adjacent circular strips 4" (Column 5, lines 10-16) and "Further, the electrode strips may be embedded in the piezoelectric/electrostrictive portion" (Column 4, lines 15-16).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the piezoelectric/electrostrictive actuators disclosed by Takuchi in the transducer disclosed by Takahashi. The motivation for doing would have been "he present actuator is constructed to lower the required level of the drive voltage by reducing the distance between the adjacent electrode strips, i.e., the width of the piezoelectric or electrostrictive material between the adjacent electrode strips, rather than reducing the thickness of the piezoelectric or electrostrictive material of the piezoelectric/electrostrictive portion" (Column 58-64).

Allowable Subject Matter

Claim 31 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is (571) 272-2810. The examiner can normally be reached on IFP.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

GSM
6/11/2007

GM

STEPHEN MEIER
SUPERVISORY PATENT EXAMINER